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ABSTRACT

A study of the development of abstract noun definitions in children and adolescents had as its subjects 120 students evenly divided into age groups of 10-, 14-, and 18-year-olds, randomly selected from students scoring in the 40th to 88th percentiles on the Iowa Test of Basic Skills (for 10-year-olds) and the Tests of Achievement and Proficiency (for the older students). Each subject was interviewed and asked to define eight abstract nouns given in random order. The responses were coded into meaning units, including class, characteristic, criterion, synonym, extension, and negation, and their occurrences were analyzed statistically. Results show a clear pattern of emergence of abstract noun definitions. The occurrence of classificatory, characteristic, and criterion responses increased with age, and the synonym, extension, and negation responses decreased with age. In all age groups, negation played an important part in noun definitions. Few subjects at any age seemed to be aware that their definitions were too broad or too narrow. No significant sex differences or interactions of sex and age were found. The findings suggest that an appropriate task in education is to help students fine-tune their understanding of abstract meanings. (MSE)

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THE DEVELOPMENT OF ABSTRACT NOUN DEFINITIONS

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THE DEVELOPMENT OF ABSTRACT NOUN DEFINITIONS

Purpose

Definitions are basic to every aspect of our existence (Hillocks, forthcoming). Our every day actions are informed by the definitions that we have. Take, for example, the new Balans chair which is so popular among home computer users. It has neither legs, nor arms, nor back, but rather two rockers supporting one large pad and two smaller parallel pads. It looks unsafe. In spite of its unusual appearance we know it is a place for sitting since we are told that it is a chair. Our definition of chair guides our behavior toward this object. With some anxiety, we rest our hips upon the larger pad, our knees upon the two smaller ones, and in this semi-kneeling position, we discover that if we lean forward we can maintain our balance. Thus we manage to kneel on or to sit upon this object called a chair.

More complex definitions underlie our legal system, scientific and medical practice and our religious and ethical thinking. The controversy over abortion is essentially a problem of definition. "What is life?" "When does life begin?" "How far does the protection of the Fourteenth Amendment extend?" Other recent controversies about euthanasia and pornography are also problems of definitions.

While not obviously apparent, the ability to define develops. From the results of research on word definitions, we have learned that the ways in which children define words change qualitatively over time; that is, the types of definitions that children give change with growth. When preschool children define a noun, they usually do so by giving a functional response

("A chair is to_sit_on.") (Al-Issa, 1969; Anglin, 1977; Binet and Simon, 1916; Feifel and Lorge, 1950; Litowitz, 1977; Nelson, 1978; Norlin, 1981; Piaget, 1928; Swartz and Hall, 1972; Wolman and Barker, 1965). Descriptive responses ("An apple has a_stem and is round and juicy."), temporal/spatial responses ("A bed is used at_nap_time."), origin responses ("Food comes from animals."), and extensive responses ("Woofy is a dog.") also occur, but they are never the dominant definitional response at any age (Al-Issa, 1969; Anglin, 1977; Nelson, 1978; Norlin, 1981; Swartz and Hall, 1972). As children mature, they begin to use nominal phrase markers like "something," or "a thing that," to substitute for a word's superordinate class name ("A chair is something to sit on.") (Burns, 1960; Litowitz, 1977; Watson, 1982). Later still, around the age of 10, children begin to define a noun in terms of its superordinate class ("An apple is a_piece_of_fruit."), and functional responses begin to decrease proportionately (Al-Issa, 1969; Russell and Saadeh, 1962; Swartz and Hall, 1972). However, functional responses as well as descriptive, temporal/spatial, and classificatory responses remain a part of a mature adult definition (Al-Issa, 1969; Anglin, 1977; Kirkpatrick, 1907; Nelson, 1978) although single extensive responses (examples) are rare (Anglin, 1977).

From the foregoing research we get a beginning understanding of the development of word definitions. Yet, most of the definitional research has been on words that inform our daily actions, i.e. on concrete words, such as, chair, flower and dog. A word can be said to be concrete to the extent the it represents a concept which has tangible objects as its referents and abstract to the extent that it represents a concept which has no tangible referents (Flavell, 1970; Klausmeier, Ghatala, and Frayer, 1974). Virtually nothing is known about the development of abstract noun definitions, the kinds of definitions which underlie our attempts at more complex human

understanding.

Ignorance about the development of abstract noun definitions exists for several reasons. First, when a few abstract nouns have been used as stimuli, they have been unfamiliar to the youngest children (Kruglov, 1953; Russell and Saadeh, 1962), or they have been presented only to the oldest children (Binet and Simon, 1916; Feifel and Lorge, 1950; Terman, 1916; Terman and Merrill, 1937; Wechler, 1949). As a result of these procedures, it has been found that younger children, naturally, do not define abstract nouns and that older children sometimes define abstract nouns by giving "explanatory" responses (Feifel and Lorge, 1950; Kruglov, 1953), "abstract" responses (Russell and Saadeh, 1962), or "symbolic" responses (Wechler, 1949). But, the responses of "explanatory," "abstract," and "symbolic" are uninformative since the investigators do not tell us what is meant by them.

Second, it is implicitly assumed that abstract noun definitions do not develop. Binet and Simon (1916) believe that children first define abstract nouns by giving mature lexicon definitions. And Terman and Merrill (1937) believe that any definition given to an abstract noun by a child of any age is as good as any other, implying that there are no age differences in the definitional responses given.

The purpose of this study is to broaden our understanding of definitional development by looking at the ways in which 10, 14 and 18 year olds define abstract nouns. Specifically, we want to know if abstract noun definitions do develop, and if they do, what types of responses are produced in the process of defining.

Class, Intension, Extension

Tradtionally a concept may be defined by class, intension or extension. A classificatory response states the superordinate class to which the term

belongs. Classificatory responses are more likely to be given to concrete nouns, e.g., "A chair is a piece of furniture." As Anglin (1977) states, "The ability to produce a superordinate decreases monotonically with the level of generality of each term within a given hierarchy [taxonomy]" (p.228). In spite of this observation, classificatory responses can be given to abstract nouns even though it may be more difficult to place abstract nouns in a taxonomy and at a low level of generality than it is to place concrete nouns. In the sentence, "Courage is a state of mind or spirit that enables one to face danger," "a state of mind or spirit" is the superordinate class to which courage belongs. Likewise, in the sentence, "Freedom is a condition in which one is unrestrained," "a condition" is the superordinate class.

An intensive definition is one which states the characteristics or properties common and peculiar to the objects or examples of a given term (Anglin, 1977; Copi, 1972). The intension of the term "book" are the characteristics common to all reading material with a certain shape and construction; that is, written or printed pages fastened along one side and encased between covers.

Yet, the characteristics of a given term do not necessarily have to be physical attributes (e.g. "wooden," "red") (Aristotle, *Posterior Analytics* and *Topics*; Copi, 1972; Flavell, 1970; Klausmeier, 1965; Jenkins 1966). As Copi (1972) states:

> It should be kept in mind that the conventional connotation [intension] of a term need not be an intrinsic characteristic of the things denoted by it, but might well have to do with the origin of those things, the relations they have to other things, or the uses to which they are put. Thus the word "Stradivarius," which denotes a number of violins, need not connote any actual physical characteristic shared by all those violins and not possessed by any other, but rather has the conventional connotation of being a violin which was made in the Cremona workshop of Antonio Stradivari. Again, governors are not physically or mentally different from all other men, they simply are related differently to their fellows. Finally, the word "shoe" cannot

> be defined exclusively in terms of the shapes or materials of the things denoted by it; its definition must include reference to the use to which those things are put, as outer coverings for the foot. (p.137)

Thus an intensive definition of a term may include the term's intrinsic characteristics as well as its origins, uses, relationships, and other types of characteristics and associations.

While concrete nouns are typically defined by description and function, abstract nouns are typically defined by giving their general ideational characteristics which are characteristics derived from ideas and relationships between ideas. As Terman (1916) states, "abstract meanings. . . are not the immediate result of perceptual processes, but a refined and secondary product of relationships between other ideas" (p.285). If we can agree that "doing anything you want" is an ideational characteristic of freedom and that "what really happns" is an ideational characteristic of truth, then the definitions, "Freedom is doing anything you want to do," and "Truth is what really happened" are intensive definitions, albeit, abstract ones.

An extensive definition is one which states the objects or examples to which the given term may be applied (Anglin, 1977; Copi, 1972). The extension of the term "book" is *Little Women*, *The Grapes of Wrath*, *The Sound and the Fury*, and so forth. The difference between extensive definitions for concrete and abstract nouns is that for concrete nouns, objects are listed (daisy for flower), whereas for abstract nouns, events are usually listed. "One cannot see justice, for example, but one is often confronted with situations in which justice or injustice is an element." (Terman, 1916, p.285). Another way of stating this point is that instances as well as characteristics of abstract nouns are conceptual rather than perceptual in nature (Flavell, 1970). "Freedom is like when you are in jail and someone comes and bails you out" is an example of an abstract extensive definition when freedom is the term being defined. This response is an account of a

particular situation or event which exemplifies freedom.

In summary we can say that it is possible to define abstract nouns by giving traditional classificatory, intensive, or extensive responses. It is through this categorical system that children's abstract noun definitions are first approached in the pilot study.

The Classificatory, Intensive, and Extensive Model Revised

A small pilot study was conducted to explore whether the classificatory, intensive, and extensive model would be adequate to investigate the development of abstract noun definitions. Five fourth grade students, five eighth grade students and three twelfth grade students of average verbal ability were asked to define the abstract nouns, "courage," "truth," and "freedom." As the definitions were analyzed it soon became apparent that while 10, 14 and 18 year olds did give classificatory, intensive, and extensive responses in defining abstract nouns, they gave other types of responses as well. The responses identified in the pilot study are 1) class, 2) characteristic, 3) criterion, 4) synonym, 5) extension, 6) negation, and 7) miscellaneous. The traditional categories of class, intention (characteristics), and extension are retained in this model and the new categories of criterion, synonym, negation, and miscellaneous are added. See table 1 for an outline of the definitional responses. The seven definitional responses are the responses used in the present study to analyze abstract noun definitions. The definitional responses are now discussed in detail.

Definitional Responses

Class

Classificatory responses are responses which refer to the superordinate

TABLE 1

DEFINITIONAL RESPONSES

I. Class
   a. Explicit Class
   b. Implicit Class

II. Characteristic
   a. Function
   b. Action
   c. Feature
   d. Time/Space
   e. Origin
   f. Ideation

III. Criterion

IV. Synonya
   a. True Synonya
   b. Similar

V. Extension
   a. Specific Event
   b. Type

VI. Negation
   a. True negation
   b. Antonya

VII. Miscellaneous
   a. Structural Statement
   b. Simple Repetition
   c. Undeciperable Comment
   d. Task Comment
   e. Off-Target Comments & Errors
   f. Restatements

class to which the definiendum belongs. Classificatory responses can be divided into two subcategories: explicit class and implicit class.

Explicit Class

An explicit class is a response which refers to the genus or superordinate to which the definiendum belongs, e.g., "Courage is a state of mind which enables a person to face danger." "A state of mind" is the superordinate class to which courage belongs. "Which enables a person to face danger" is a functional characteristic response.

Implicit Class

Implicit classificatory responses are responses which use words such as, "something," "stuff," or "a thing that" to stand for the superordinate name, e.g., "Courage is something that helps you to do what you have to do." "Something" is the implicit class. The latter part of the sentence is a functional characteristic response.

Characteristic

A characteristic response is a response which refers to the properties or attributes of the definiendum; that is, a quality belonging to or associated with an idea. There are six types of characteristic responses: 1) function, 2) action, 3) feature, 4) time/space, 5) origin, and 6) ideation.

Function

A functional response is a response which refers to the use to which the definiendum is put. "You need courage to do things that you really don't want to do" is an abstract functional response.

Action

An action response is a response which refers to how the definiendum

behaves, e.g., "Wisdom grows."

Feature

A feature response refers to an attribute of the definiendum but is not an action; i.e. "Justice is blind."

Time/Space

A temporal/spatial response is a response which refers to the location of the definiendum and/or the time associated with it, e.g., "Freedom is in the United States."

Origin

An origin response is a response which refers to how the definiendum began, e.g., "We have freedom from the Constitution.

Ideation

An ideational response is a response which refers to characteristics derived from ideas or relationships between ideas. These responses are typically given to abstract nouns. "Truth is what really happened," "Freedom is having choices," and "Freedom is being able to do what you want to do" are examples of ideational responses to abstract nouns.

Criterion

A criterial response indicates an awareness of or an attempt to find the boundaries or the limits of the definiendum and which, thereby, permits a finer discrimination of the definiendum from other like entities or states. These responses usually follow other types of responses. "Freedom is doing anything that you want, but it has to be within the law" is an example of a criterial response following a characteristic response. Another example is "Sin is something wrong that you do. Something that you should not do and

that you know that you shouldn't do." "That you know that you should'n't do" is the criterial response following implicit classificatory, ideational characteristic, restatement (of an implicit classificatory) and negation responses.

Synonym

Synonymous responses are responses which state that the definiendum is identical or similar to another coordinate word or concept. There are two types of synonymous responses: true synonyms, which refer to absolute relations, and similars, which refer to partial relations.

True Synonym

A true synonymous response is a one word response which is equivalent in meaning to the definiendum. Synonymous responses usually follow a form of the verb, to be or to mean, and are predicate nominatives or adjectives. "Truth is reality and "Courage means bravery" are examples of abstract synonymous responses. "Reality" and "bravery" are the synonyms.

When the synonymous response contains a synonym modified by an adjective, adverb or noun, i.e., "Truth is absolute honesty," the response is still classified as a synonymous response. But when a response contains a synonym modified by a phrase or a clause, i.e., "Courage is being brave enough to do a fearful thing," the response is no longer classified as a synonymous response but rather as an ideational response. The response is too elaborate to qualify as a synonym--a one or a two word equivalent response. The emphasis has changed from concise expression to extended expression.

Similar

Similar responses are responses which state that the definiendum is

similar to another coordinate word or concept. Words, such as, "sort of like," kind of like," and "similar to" are sometimes used in these types of responses. "Courage is being kind of brave" is an example of an abstract similar response.

Extension

Extensive responses refer to subordinates of the definiendum, e.g., kinds of, examples, and instances of the definiendum. Extensive responses are divided into two subcategories: 1) specific events or situations, and 2) types.

Specific Events

Specific events or situations are responses which refer to idiosyncractic, experiential, or actual experiences, e.g., "Freedom is like when you are in jail and someone comes and bails you out."

Specific event responses are usually given by older children after other types of definitional responses, such as, characteristic responses or coordinate responses, have been given. In the following twelfth grade definition, "Courage isn't bravery. You need courage to do things that you really don't want to do. Like if you are a doctor, you have to be able to tell somebody that they are dying," the underlined sentence is the extensive response. The first sentence in the definition is a negation (of a synonym). The second sentence in the definition is a functional characteristic response.

Younger children usually do not precede their extensive responses by other types of responses as older children do. If the younger child is inclined to give an extensive response, the child will usually respond to the definitional task by immediately describing a particular situation which is an instance of the definiendum, i.e., "Courage is riding on the American Eagle [a large roller coaster]."

Types

These responses are not descriptions of particular situations, but rather, they are enumerations of subordinate categories of the definiendum. The sentence, "There are two types of courage: physical and mental courage," is an example of a type response to an abstract word. "Physical courage" and "mental courage" are subordinates of "courage."

Negation

There are two kinds of negative responses: true negations and antonyms.

True Negations

A true negative response is a response in which the main verb is negated and which, therefore, expresses what the definiendum is not rather than what it is. "Freedom is not being bound by anything or anybody is an example of a true negative response to an abstract noun. The response is negating an ideational characteristic. True negative responses may negate classificatory, characteristic, criterion, synonym, and extensive responses. If a verb is negated before a word opposite in meaning to the definiendum, the response is coded as an antonym.

Antonyms

An antonymous response is a response which is opposite in meaning or which states that a word is opposite in meaning to the definiendum. "The opposite of truth is false" is an example of an abstract antonymous response.

Miscellaneous

Miscellaneous responses are responses which do not give any information about the meaning of the definiendum and, therefore, are technically not

definitional responses. There are several types of miscellaneous responses.

Structural Statements

Structural statements are statements which serve as a bridge to another thought or which indicate closure of a thought process, e.g., "Courage is being strong enough to do something that you are afraid of. That's what courage is." "That's what courage is" is the structural statement preceded by a characteristic response.

Simple Repetitions

Simple repetitions are responses in which the definiendum or a derivative of it is repeated, e.g., "Freedom is free."

Undecipherable Comments

Comments which are meaningless or which cannot be understood are called undecipherable comments, e.g., "I would say, ah, ah, well . . ."

Task Comments

Remarks about the definitional task are task comments, e.g., "Truth is a hard word to define."

Off-Target Comments and Errors

Comments which do not give correct information about the meaning of the definiendum are off-target comments and errors. "Justice is freedom" and "Sin is everybody's profession" are examples of this type of response.

Restatements

Responses which are repeated are restatements. Restatements usually appear two or three responses after the original response, e.g., "Truth is not lying. Truth is telling what really happened, what really occurred. Not lying. That's all I can think of." In this definition of truth given by

one child, "what really occurred" and "not lying" are restatements.

Description of the Study

Forty students each at the ages of 10, 14, and 18 (120 subjects in all) were asked to define eight abstract nouns. The average age for children in the fourth, eighth, and twelfth grades was 10 years and 0 months, 13 years and 9 months, and 17 years and 9 months, respectively. The subjects were divided evenly between male and female and attended Chicago public schools. Children at the ages of 10 and 14 were randomly selected from only those children whose parents approved their participation and who scored at the 40th percentile through the 88th percentile on the vocabulary and reading sections of the Iowa Tests of Basic Skills (ITBS) administered in the spring of 1983. Because the ITBS is not designed for young people over the age of 14, 18 year olds were randomly selected from those scoring at the 40th percentile through the 88th percentile on the written expression and reading sections of the Tests of Achievement and Proficiency (TAP) administered in the fall of 1983. Both the ITBS and the TAP correlate highly with the Lorge-Thorndike Intelligence Test (L-T) (Technical Manual, Lorge-Thorndike Intelligence Tests, 1966). At the third grade, the correlations between the vocabulary and reading batteries of the ITBS and the L-T verbal battery are .71 and .68 respectively. At the seventh grade, the correlations are .80 and .81 respectively. At the eleventh grade, the correlation between the reading battery of Tests of Academic Progress and the L-T verbal battery is .81. Tests of Academic Progress are the forerunners of the Tests of Achievement and Proficiency, and, as such, had no written expression battery as the newer form has today. Therefore, no correlation coefficient between this battery and the L-T verbal battery can be reported.

The average score on the ITBS for 10 year old boys was 69.3% and the

average score for 10 year old girls was 79.3%. The group average was 69.8%. For 14 year olds, the average score for the boys was 65.5% and for the girls, 67.8%. The 14 year old average was 66.5%. The average score on the TAP for 18 year old boys was 70.8% and for the girls, 68.3%. The 18 year old average was 69.5%

Interview

Each subject was interviewed separately and asked to define 8 abstract nouns which were given in random order. The interviews were recorded and the definitions were later transcribed. Following traditional procedures, the interviewer asked the standard question, "Give me a definition for X." If the subject did not respond, the interviewer said, "If you had to explain to a friend what the word X means so that your friend would understand, what would you say?" If the subject still did not answer, the interviewer asked the subject to define the next word. This procedure continued until the subject had been asked to define all 8 abstract nouns. At the end of the session, the interviewer once again asked the subject to define those words which were by-passed.

Words

The abstract nouns which were used as stimuli in the study were selected on the basis that they should be familiar to the youngest subjects. The nouns were beauty, courage, freedom, happiness, justice, sin, truth, and wisdom. These words were selected from among the ideas listed in *The Great Ideas: A Syntopicon of the Great Books of the Western World* (Hutchins, 1952). All of the abstract nouns fell within the first 2,000 most frequently used words as reported by Thorndike (1932) in his study of reading material. Thorndike chose his reading material from children's literature,

elementary textbooks, newspapers, the Bible, English classics, books about cooking, sewing, farming, and from correspondence.

Units of Analysis

Coding of qualitative data involves two operations, that of separating the qualitative material into units, and that of establishing categories into which the unitized material may be classified (Berelson and Lazarsfeld, 1948; Guetzkow, 1950; Holsti, 1969). The latter operation, that of establishing categories into which the unitized material may be classified, has been discussed above. Separating the qualitative material into units will be discussed now.

From the literature on content analysis, Berelson and Lazarsfeld (1948) and Holsti (1969) identify five traditional units of analysis: 1) the word (the symbol), 2) the theme (a sentence, i.e., an assertion about some subject containing a subject and a predicate), 3) the character (an historical or fictional person), 4) the item (the natural unit, i.e., a story, a speech, a letter), and 5) space-time (a physical division, i.e., column inch or feet of film).

The unit of analysis used in this study is a sub-category of the theme called the "meaning-unit." A "meaning-unit" is defined as the smallest piece of content that makes an assertion. A meaning-unit does not have to be as large as a sentence (Waples and Berelson, 1941). Thus, the definition, "Happiness is a feeling that makes you glow," contains two meaning-units, "Happiness is a feeling" and "Happiness makes you glow." These meaning-units are coded as "explicit class," and "functional characteristic," respectively. The definition, "Freedom would be that you are your own person," contains one meaning-unit, "Freedom is being your own person," and this unit is classified as an "ideational characteristic."

The selection of the meaning-unit and the amount of material to be included in each unit is dependent upon the demands imposed by the coding categories. In fact, the selection of unit size seems more dependent upon the categories chosen than choice of categories seems to depend upon unit size (Guetzkow, 1950). For example, if the purpose of a study is to determine what types of prepositions, adverbs, prefixes and suffixes the young child uses, the unit of analysis selected will be the word. In this case, the unit of analysis is almost identical to the category. So too are the meaning-units and the categories in this study. They are identical to one another.

Inter-rater Reliability

One rater coded all 960 definitions. A second rater coded 50 definitions (Guetzkow, 1950); 10 definitions at the 10 year old level, 15 definitions at the 14 year old level, and 25 definitions at the 18 year old level. Within these groups, the definitions were randomly selected with males and females contributing equally.

Inter-rater reliability for coding the definitional responses was .91. The reliability index was calculated by using a formula suggested by Scott (1955) when categorial responses represent nominal scale data and there is a probability that all response catgories do not have an equal chance of being used. Because Scott's formula produces a conservative estimate of reliability, the "true" reliability index may be higher (Holsti, 1969).

Results

Each time one of the definitional responses of 1) class, 2) characteristic, 3) criterion, 4) synonym, 5) extension, and 6) negation was given in a definition it was counted as 1. From this count, the percentage of each

definitional response out of the total number of definitional responses across the 8 words was calculated for each subject. Miscellaneous responses were used only for coding purposes. They were excluded from the calculation since they add nothing to the understanding of how subjects define words, i.e., they represent a noise factor. The percentages calculated by subject were the dependent measures in a 3x2x6 factorial design. Arc sine transformations were created over the dependent measures. Multivariate analysis of variance of repeated measures was conducted to determine if there were significant differences between the percentages of definitional responses given to abstract nouns by age and sex.

The data suggest that abstract noun definitions do develop. If we look at Table 2 we can see that a clear pattern emerges. The mean percentage of each of the responses of classificatory, characteristic and criterion increases by age, whereas, the mean percentage of each of the responses of synonym, extension and negation decreases by age.

The most frequent response given by all three age groups is characteristic. At 10 years of age 38.3% are characteristic responses; at 14 years, 47.4% are; and at 18 years, 53.3% are characteristics. The second and third most frequent responses at ages 10 and 14 are negations and synonyms. However, the percentage of these responses decreases with age. The mean percentage of negations decreases from 23.0% at age 10 to 13.4% at age 18. The mean percentage of synonyms decreases from 18.4% at age 10 to 7.8% at age 18. Classificatory responses replace synonymous responses and become the second most frequent response at age 18. The mean percentage of classificatory responses increases from 9.5% at age 10 to 16.5% by age 18. Negation responses are the third most frequent response at age 18.

One of the most infrequent definitional response for all age groups is

criterion. The mean percentage of criterion responses ranges from only 2.4% at age 10 to 5.1% at age 18. While children give more criterion responses as they mature, they do not very often state the critical attributes of the definiendum which distinguish it from other like entities or states. They do not "fine-tune." As a result, most of their definitions are either too broad or too narrow. For example, in the definition, "Sin is something wrong that you do," the definiens denotes more than it should. Every wrong-doing is not a sin. In the definition "Beauty is something nice to look at," the definiens denotes less than it should. Beauty is not limited to visual perception.

TABLE 2

PERCENTAGE OF DEFINITIONAL RESPONSES
BY SEX AND AGE*

Definitional Responses	10 Years			14 Years			18 years		
	Male	Female	Mean %	Male	Female	Mean %	Male	Female	Mean %
Class	9.3	9.6	9.5	10.5	10.5	10.5	16.8	16.2	16.5
Characteristic	35.4	41.3	38.3	49.3	45.5	47.4	52.5	54.1	53.3
Criterion	1.7	3.0	2.4	3.6	4.2	3.9	4.2	6.1	5.1
Synonym	21.4	15.4	18.4	14.3	16.7	15.5	6.3	9.2	7.8
Extension	8.5	8.3	8.4	7.6	9.2	8.4	4.5	3.4	3.9
Negation	23.7	22.4	23.0	14.7	14.0	14.3	15.7	11.0	13.4
Totals	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*There were a total of 120 subjects; 40 subjects at each age level divided equally between male and female. Each subject defined 8 abstract nouns for a grand total of 960 definitions. There were 320 definitions at each age level or 160 at each sex level. A definition could contain more than one type of response.

Multivariate test statistics ($F = 4.76$, d.f. = 10, 220) revealed that the differences in the mean percentage of responses are a function of age and

are highly significant ($p < .0001$). When univariate F tests were conducted to determine where the significant multivariate effect lay, only two contrasts out of a total number of 15 contrasts show no significant differences by grade. The two contrasts which are not significant are between synonym and negation, and synonym and extension. There are no significant sex differences or interactions between sex and age.

Discussion

We need to ask ourselves why it is that some of these responses increase with age and why some of them decrease with age. It is suggested that defining with the responses of classificatory, characteristic and criterion involves a process of analysis, while defining with the responses of synonym and extension does not. If logical thinking, which includes the ability to analyze, grows with age (Inhelder and Piaget, 1958), then it is not suprising that responses reflecting this ability would increase, while responses not reflecting this ability would decrease.

Analyzing requires the subject to determine the nature of the whole; to separate into parts; to examine methodically. In terms of what it means to define words analytically, the subject places the word in a hierarchy or a system of thought ("Freedom is a condition), determines its attributes ("Freedom is having choices in everything you do"), and examines its limits ("Freedom is doing anything you want as long as its lawful."). In other words, the subject gives classificatory, characteristic or criterion responses which tell us a great deal about the meaning of the word being defined. The subject obviously sees the word as an object to think about, and not solely as a tool to think with. Defining analytically by classificatory, characteristic and criterion responses is a metalinguistic task.

A serious limitation to the method of defining is to give synonymous

and extensive responses. These responses tell us little about the meaning of the word. Unless we know the meaning of a word's synonyms, we are unlikely to understand the meaning of the word being defined. "Truth means veracity" is uninformative if we do not know the meaning of the word veracity. And giving examples or extensive responses does not delineate or help to distinguish between the meanings of any two terms. For instance, "going to a party on Saturday night" does not distinguish among the meaning of the words, happiness, freedom, or perhaps even apprehension. In giving these responses, the subject does not determine the nature of the whole, or examine methodically, or separate the whole into parts. When defining by synonym and extension, it is as if the word is being used only to prod one's memory of a like term or of an event associated with it. As Vygotsky (1934/1962) states, "the child or adolescent . . . often descended to a more primitive level of thought in giving a verbal definition . . . and began simply to enumerate the various objects to which the concept applied . . . ." (p.80). The subject obviously sees the word as an instrument of thought and not as an object of thought. Defining by synonym and extension decreases with age and seems to be a non-analytic and a non-metalinquistic task.

What about negation responses? Are they analytic or non-analytic? Like synonymous and extensive responses which are non-analytic, negation responses decrease with age and tell us nothing about the meaning of the word. In fact, negation responses tell us what the meaning of the word is not rather than what the meaning of the word *is*. Yet if we look at negation responses more closely, we find that they are a special and interesting case. They are both analytic and non-analytic.

As previously mentioned, negations are of two kinds: true negations and

antonyms. True negations can negate classificatory, characteristic, criterion, synonymous and extensive responses. The negation response of antonym negates no other response. It is simply a type of negation response.

When true negation responses negate classificatory, characteristic, and criterion ("Freedom is not being bound by anything or anyone"), they are negating analytic responses When true negation responses negate synonymous and extensive responses ("Freedom is not having to practice the piano), they are negating non-analytic responses. Negations are the only definitional response which can be analytic or non-analytic or antonym. These negated responses duplicate the responses found in the larger framework. There we had analytic, non-analytic, and negation. Here we have negated analytic, negated non-analytic, and antonym. Will these two sets of similar responses show the same developmental pattern?

When the percentage of the different types of negation responses by age is compared with the percentage of analytic, non-analytic, and negation responses by age, the same type of development is found within the negation responses as is found among analytic, non-analytic, and negation responses.

Tables 3 and 4 clearly show this similarity. In Table 3, the responses of class, characteristic, and criterion are combined to form the category of analytic; the two responses of synonym and extension are combined to form the category of non-analytic; and the response of negation remains as the category of negation. The mean percentage of analytic responses increases with age while the mean percentage of non-analytic responses and negation responses decreases with age. At 10 years of age, the mean percentage of analytic responses is slightly more than the percentage of non-analytic and negation responses combined. Analytic responses are 50.2% of the total

responses given by 10 year olds and non-analytic and negations combined are 49.8%. By the age of 14, 61.8% of their responses are analytic and 38.2% are non-analytic and negations combined. At 18 years, analytic responses are given three times as often as non-analytic and negation responses combined. Analytic responses are 74.9% of the total number of responses and non-analytic and negation combined are 25.1%.

TABLE 3

PERCENTAGE OF ANALYTIC, NON-ANALYTIC, AND NEGATION RESPONSES OUT OF THE TOTAL NUMBER OF DEFINITIONAL RESPONSES BY AGE*

Response	10 Years	14 Years	18 Years
Analytic	50.2	61.8	74.9
Non-Analytic	26.8	23.9	11.7
Negation	23.0	14.3	13.4
Totals	100.0	100.0	100.0

*There were a total of 120 subjects; 40 subjects at each age level. There was a grand total of 960 definitions with 320 definitions at each age level. A definition could contain more than one type of response.

When only the negation responses are examined, a similar pattern of definitional development emerges. Table 4 lists the mean percentage of negated responses by age out of the total number of negated responses. The mean percentage of negated analytic responses increases with age, while the mean percentage of negated non-analytic and antonymous responses decreases with age. At 10 years of age the negated analytic responses are 59.3% and the negated non-analytic responses and antonyms combined are 40.7%. By age

14, 67.9% of the responses are negated analytic responses while 32.1% are negated non-analytic responses and antonyms combined. At age 18 negated analytic responses are given three times as often as negated non-analytic responses and antonyms combined. Negated analytic responses are 75.8% and negated non-analytic and antonyms combined are 24.2% Even though negation responses as a whole decrease with age, internally, they show a strikingly similar developmental pattern as the pattern among analytic, non-analytic and negations.

TABLE 4

PERCENTAGE OF NEGATED ANALYTIC, NEGATED NON-ANALYTIC, AND ANTONYMOUS RESPONSES OUT OF THE TOTAL NUMBER OF NEGATION RESPONSES BY AGE*

Responses	10 Years	14 Years	18 Years
Negated Analytic	59.3	67.9	75.8
Negated Non-analytic	10.6	8.9	5.3
Antonyms	30.1	23.2	18.9
Total	100.0	100.0	100.0

*There were a total of 120 subjects; 40 subjects at each age level. The total number of negations responses given by 10 year olds was 113; by 14 year olds, 112; and by 18 year olds, 132.

Conclusions

Just as concrete noun definitions develop, so do abstract noun definitions. Not surprisingly, the ability to give a mature dictionary definition grows with age. At the age of 10, children are just as likely to give class, characteristic, and criterias as they are to give synonyms, extensions, or negations. By the age of 18, three-fourths of the defini-

tional responses are classificatory, characteristic, and criterion. It is suggested that to give these latter types of responses requires a process of analysis and viewing the word as an object of thought and not simply as a tool of thought. Defining by giving the responses of classificatory, characteristic, and criterion is a metalinguistic task.

One of the more surprising findings from the study is the importance of negations responses in defining abstract nouns. They are the second most frequently used response by 10 year olds, and the third most frequently used response by both 14 and 18 year olds. The mean percentage of negations at 10 years of age is 23% decreasing to 13% by age 18. For younger children especially, negations play a dominant role in defining abstract nouns.

When negations are examined more closely, the development within negation responses follows the pattern found without. Just as analytic responses increase with age, so do negated analytic responses. Conversely, just as non-analytic and negation responses decrease with age, negated non-analytic and antonyms decrease with age. It may seem strange to define a word by saying what it is not, but even so, negation responses do repeat a the broader pattern of definitional development.

And finally, one small alarming note. Even at the age of 18 there does not seem to be an awareness that the definitions given are either too broad or too narrow. Few subjects give or even tried to give criterion responses which delineate the definiendum from other word meanings. When professional, medical, legal and ethical decisions are based upon establishing criteria, it seems important that children should develop the ability to engage in the intellectual process of creating criteria. Since recent research has indicated that schooling can influence the development of a child's ability to define (Watson, 1982), it may be a proper task to

encourage children to "re-tune" their understanding of abstract meanings which underlie our problems of human understanding.

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